

Equations Chart

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POWER

Trigonometry

Pythagorean Property - Sine and Cosine	$\sin^2 \theta + \cos^2 \theta = 1$
Sine Definition for a Right Triangle	$\sin \theta = \text{Opposite Side} / \text{Hypotenuse}$
Cosine Definition for a Right Triangle	$\cos \theta = \text{Adjacent Side} / \text{Hypotenuse}$
Tangent Definition for a Right Triangle	$\tan \theta = \text{Opposite Side} / \text{Adjacent Side}$
Double Angle Identity - Sine	$\sin 2\theta = 2 \sin \theta \cos \theta$
Double Angle Identity - Cosine	$\cos 2\theta = \cos^2 \theta - \sin^2 \theta = 2 \cos^2 \theta - 1$
Half Angle Identity - Sine	$\sin (\theta/2) = \sqrt{((1 - \cos \theta)/2)}$
Half Angle Identity - Cosine	$\cos (\theta/2) = \sqrt{((1 + \cos \theta)/2)}$
Sum and Difference of Angles Identity - Sine	$\sin (\theta_1 \pm \theta_2) = \sin \theta_1 \cos \theta_2 \pm \cos \theta_1 \sin \theta_2$
Sum and Difference of Angles Identity - Cosine	$\cos (\theta_1 \pm \theta_2) = \cos \theta_1 \cos \theta_2 \mp \sin \theta_1 \sin \theta_2$
Pythagorean Property - Tangent & Secant	$1 + \tan^2 \theta = \sec^2 \theta$
Pythagorean Property - Cotangent & Cosecant	$\cot^2 \theta + 1 = \csc^2 \theta$
Reciprocal Property - Tangent & Cotangent	$\cot \theta = (1 / \tan \theta)$
Reciprocal Property - Sine & Cosecant	$\csc \theta = (1 / \sin \theta)$
Reciprocal Property - Cosine & Secant	$\sec \theta = (1 / \cos \theta)$
Quotient Property - Tangent, Sine & Cosine	$\tan \theta = \sin \theta / \cos \theta$
Quotient Property - Tangent, Secant & Cosecant	$\tan \theta = \sec \theta / \csc \theta$
Quotient Property - Cotangent, Cosecant, & Secant	$\cot \theta = \csc \theta / \sec \theta$
Quotient Property - Cotangent, Cosine & Sine	$\cot \theta = \cos \theta / \sin \theta$
Area of Arbitrary Angle	$A = \frac{1}{2} ab (\sin C)$
Law of Sines	$(\sin A) / a = (\sin B) / b = (\sin C) / c$
Law of Cosines	$a^2 = b^2 + c^2 - 2bc (\cos A)$
Sum and Difference of Angles Identity - Tangent	$\tan (\theta_1 \pm \theta_2) = \frac{\tan \theta_1 \pm \tan \theta_2}{1 \mp \tan \theta_1 \tan \theta_2}$
Cotangent Definition for a Right Triangle	$\cot \theta = \text{Adjacent Side} / \text{Opposite Side}$
Cosecant Definition for a Right Triangle	$\csc \theta = \text{Hypotenuse} / \text{Opposite Side}$
Secant Definition for a Right Triangle	$\sec \theta = \text{Hypotenuse} / \text{Adjacent Side}$



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Geometry

Eccentricity of a Hyperbola	$\varepsilon = \frac{\sqrt{a^2 + b^2}}{a}$
Eccentricity of a Ellipse	$\varepsilon = \frac{\sqrt{a^2 - b^2}}{a}$
Equation of a Plane	$Ax + By + Cz + D = 0$
Equation of a Parabola	$(y - y_0)^2 = 4a(x - x_0)$
Perimeter of a Circle	$P = 2\pi r$
Perimeter of a Rectangle	$P = 2l + 2w$
Perimeter of a Square	$P = 4s$
Perimeter of a Triangle	$P = a + b + c$
Perimeter of a Regular Polygon	$P = ns$
Arc Length	$s = r\theta$



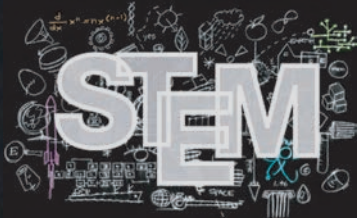
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Physics

Kinetic Energy	$E_k = \frac{1}{2} mv^2$
Equation of Linear Motion	$x(t) = x_0 + vt + \frac{1}{2} at^2$
Spring Constant	$k = F/x$
Angular Momentum	$M = I\omega$
De Broglie Wavelength	$\lambda = h/mv$
Newton's Second Law (Force)	$F=ma$
Ohm's Law	$V = IR$
Centripetal acceleration	$a = v^2/r$
Instantaneous Acceleration	$a = dv/dt = (d^2x)/(dt^2)$
Velocity	$v = v_0 + at$
Average Velocity	$v_{av} = \Delta s/\Delta t$ (where s = position & t = time)
Acceleration	$a = (v_f - v_o)/t$
Average Acceleration	$a_{av} = \Delta v/\Delta t$
Speed of Sound Waves in a fluid	$v = \sqrt{B/\rho}$
Torque on a current loop	$\tau = m \times B$
Acceleration of freefall on Earth (Gravity)	$g = 9.8 \text{ m/s}^2$



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Algebra

Additive Identity Property

$$a + 0 = a$$

Additive Inverse Property

$$a + (-a) = 0$$

Definition of Subtraction

$$a - b = a + (-b)$$

Multiplicative Inverse

$$a \times 1/a = 1$$

Definition of Division

$$a/b = a \times (1/b)$$

Square of a First Order Polynomial

$$(a + b)^2 = a^2 + 2ab + b^2$$

Polynomial FOIL Operation

$$(a+b)(c+d) = ac+ad+bc+bd$$

Difference of Squares Factorization

$$a^2 - b^2 = (a + b)(a - b)$$

Sum of Cubes Factorization

$$a^3 + b^3 = (a + b)(a^2 - ab - b^2)$$

Quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{when } ax^2 + bx + c = 0$$

Exponent Equal to Zero Rule

$$x^0 = 1$$

Addition of Exponents Rule

$$x^a x^b = x^{(a+b)}$$

Distributive Property of Exponent
Root Relationship

$$x(a/b) = b\sqrt{x}a$$

Definition of Square Root

$$x(1/2) = \sqrt{x}$$

Negative Exponent Definition

$$x^{-a} = 1/(x^a)$$

Subtraction of Exponents Rule

$$x^{(a-b)} = (x^a)/(x^b)$$

Definition of a Logarithm

$$y = \log_b(x) \text{ if } x = b^y$$

Logarithm of One

$$\log_b(1) = 0$$

Sum of Logarithms Property

$$\log_b(xy) = \log_b(x) + \log_b(y)$$

Difference of Logarithms Property

$$\log_b(x/y) = \log_b(x) - \log_b(y)$$

Logarithm of an Exponential

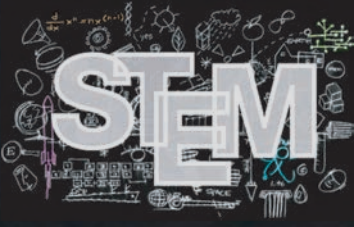
$$\log_b(x^n) = n \log_b(x)$$

Logarithm Base Conversion

$$\log_b(x) = \log_b(c) \log_c(x) = (\log_c(x))/(\log_c(c))$$

Distributive Property

$$a(b + c) = ab + ac$$



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Chemistry

Charles' Law	$V/t = k$
Electric Current	$I = q/t$
Temperature in Kelvin from Degrees Celsius	$K = ^\circ C + 273$
Density of a Material	$D = m/V$
Speed of Light to Wavelength & Frequency	$c = \lambda\nu$
Linear Momentum	$p = mv$



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Geometry

Area of a Circle	$A = \pi r^2$
Area of an Ellipse	$A = \pi r_1 r_2$
Area of an Equilateral Triangle	$A = (h^2\sqrt{3})/3$
Area of a Parallelogram	$A = bh$
Area of Rectangle	$A = lw$
Area of a Regular Polygon	$A = (nsr)/2$
Area of a Rhombus	$A = (x_1x_2)/2$
Area of a Sector	$A = (\theta r^2)/2$
Area of a Square	$A = x^2$
Area of a Trapezoid	$A = \frac{1}{2} (x_1 + x_2) h$
Area of a Triangle	$A = \frac{1}{2} bh$
Volume of a Cone	$V = (Bh)/3 = (\pi r^2 h)/3$
Volume of a Sphere	$V = (4\pi r^3)/3$
Volume of a Pyramid	$V = (Bh)/3$
Volume of a Cube	$V = x^3$
Area of a Cuboid	$V = lhw$
Volume of a Cylinder	$V = Bh = \pi r^2 h$
Volume of a Prism	$V = Bh$
Surface Area of a Sphere	$S = 4\pi r^2$
Surface Area of a Cylinder	$S = 2\pi r^2 + 2\pi rh$
Surface Area of a Cube	$S = 6x^2$
Equation of a Line	$y = mx + b$
Distance Between Two Points (2D)	$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$
Distance Between Two Points (3D)	$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$